EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-16

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-D-14-032	09/16/2014 To 09/15/2019	BenMAP-CE/GIS/Various Updates
	Base Option Period Number 1	

Contractor: INDUSTRIAL ECONOMICS, INCORPORATED

Specify Section and paragraph of Contract SOW: Section 14

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/16/2015 To 09/15/2016

Comments:

THE WORK ASSIGNMENT INCLUDES 250 HOURS FOR PREPARATION OF THE WORKPLAN/COST ESTIMATE AND TO BEGIN THE WORK ASSIGNMENT. THE CONTRACTOR SHALL PROPOSE THE HOURS NECESSARY TO COMPLETE ALL TASKS. NO PREVIOUSLY PERFORMED WORK SHALL BE DUPLICATED. SEE ATTACHED SOW

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/16/2014 To 09/15/2019		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Neal Fann (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-0209 FAX Number:
Project Officer Name: Carolyn Blake (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-5256 FAX Number:
Other Agency Official Name: (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Natalia Fisher-Jackson (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3564 FAX Number:

I. TITLE: Improving the BenMAP-CE Geographic Information System and Updating Population and Economic Valuation Datasets

II. WORK ASSIGNMENT MANAGER (WAM):

Neal Fann
EPA, OAQPS, OAR
C539-07
RTP, NC 27711
919-541-0209

III. LEVEL OF EFFORT:

Hours :
Duration: 5 months (May 15th to September 15th 2016)

IV. BACKGROUND:

In 2003 the U.S. EPA contracted with a developer to create version 1.0 of the environmental Benefits Mapping and Analysis Program (BenMAP). That tool systematized a number of the steps of a health impact and benefits analysis that had previously been performed using the Criteria Air Pollutant Modeling System (CAPMS). Subsequent versions of BenMAP incorporated a number of new features, including a database that could be modified by end-users, more spatially resolved baseline health data and a broader array of health impact functions. The U.S. EPA has used BenMAP to estimate the avoided human health impacts and economic benefits of a number of air quality policies, including the 2002 Non-Road Diesel Rule, the 2004 Clean Air Interstate Rule, and the 2011 Mercury and Air Toxics Rules, among many others. Over 50 researchers have published over 25 journal articles using BenMAP.

Beginning in 2011, the U.S. EPA began redeveloping the tool from the ground-up to meet two goals: (1) create an open-source software platform so that anyone could see the software code and improve the program; (2) improve the performance, accessibility, capabilities and usability of the software. In the Fall of 2013, after iterating through dozens of beta versions, the U.S. EPA released version 1.0 of the environmental Benefits Mapping and Analysis Program—Community Edition (BenMAP-CE). In the winter of 2015, the Agency released version 1.1 of the software, which addressed a number of bugs identified in version 1.0 and incorporated several new features designed to make it easier for non-U.S. analysts to apply the program.

The current public release version of the program (v1.1) includes a Geographic Information System that suffers from a number of bugs and lacks certain

key features critical to performing benefits analyses. Moreover, this version includes demographic and baseline mortality rates that are now quite dated.

V. STATEMENT OF WORK (SOW):

The Contractor shall conduct the following tasks in accomplishing the objective of this Work Assignment.

Task 1: Develop a work plan and project plan

The Contractor shall develop a new work plan and update the system design document as described below.

Task 1.a: Develop work plan and administer project

Within 20 calendar days of the effective date of this WA, the Contractor shall submit a work plan to the Work Assignment Manager (WAM). The Contractor shall arrange and conduct an initial phone conference with the WAM within one week of WA approval. Subsequent to this initial teleconference, the Contractor shall lead regular phone conferences on at least a weekly basis to discuss work progress and any issues associated with the work tasks. The Contractor shall prepare an agenda for such weekly meetings, record meeting minutes, and distribute such meeting minutes to all participants.

Task 1.b: Update the system design document

The Contractor, consulting with the WAM, shall develop a comprehensive and detailed project plan for each task in this WA, specifying clearly the technical and functional basis for the new version:

- The minimum design characteristics of the new software
- A workflow describing the expected inputs and outputs of each new program algorithm, including example use cases.
- Desired behavior of the graphical user interface, including sketches of windows, location of hover text, etc.
- Protocol for quality assurance of each new feature.
- Sequence in which the Contractor will address the tasks below.

The Contractor shall not modify the source code until the WAM approves this project plan. The Contractor shall develop the system design document for each new BenMAP-CE feature on a rolling basis and in consultation with the Work Assignment Manager.

Deliverables:

1.1. Work plan

1.2. System design document

Task 2: Improve the BenMAP-CE Geographic Information System, Database Elements and User Interface

The BenMAP-CE program uses an open source Geographic Information System (GIS) called DotSpatial. This GIS suffers from a few bugs and lacks certain features. The program database also lacks certain features. The Contractor shall addressed these issues by:

- Resolving two key bugs:
  - Double-clicking the color ramp on an active layer will crash the program (see below for screenshot and crash report)
  - When clicking on a grid cell (or district, state, country), it stays permanently highlighted even when clicking on other grid cells
- Incorporating six new features:
  - Provide additional methods for binning values in the symbology tab (e.g., Jenks natural breaks).
  - Permit users to select features by location (e.g., all air quality grids within a state) with either a table query or a selection tool.
  - The attribute table of exported shapefiles should include all of the fields available in the *.cfgrx or *.apvrx results files (e.g. delta, pop, etc).
  - Enable users to export database entries as .csv or .xls files (JIRA ticket BENMAP-198). Users should also be able to export grids as .shp files.
  - When opening or selecting a file, the program should reveal all valid file types available. For example, when selecting an air quality grid, the program should reveal *.aqgx, *.xlsx or *.csv files. Likewise, when users open a new file, the program should default to the folder most relevant to that element of the program (e.g. air quality grids, configuration results, etc).
  - Users who specify baseline and control air quality grids, and then subsequently open a *.cfgrx, *.cfgx, *.apvrx or *.apvx file, should not need to re-specify the air quality grids. The program should instead prompt users to indicate whether they wish to: (1) use the air quality grids they have specified; (2) instead use the air quality grids associated with the original *.cfgrx, *.cfgx, *.apvrx or *.apvx files.

Before beginning work, the Contractor shall first update the System Design Document described above. The Contractor shall provide a test version of DotSpatial, embedded within a build of BenMAP-CE, for EPA testing. The Contractor shall next revise DotSpatial to incorporate EPA comments.

Deliverables:

2.1 Revised draft version of DotSpatial correcting bugs and adding new features
2.2 Final version of DotSpatial correcting bugs and adding new features

Task 3: Updated Population and Projected Baseline Death Rates

The Contractor shall procure, and load into BenMAP-CE, the most currently available Woods & Poole population projections to the latest year available. The Contractor shall provide these data in BenMAP-CE ready input format, ensuring that the age, sex, race, and ethnicity strata match those currently represented in the program. The Contractor shall provide BenMAP-CE-ready input files in .csv and .xlsx format.

The Contractor shall also download the most current 3-year average cause-specific county-level death rates from the CDC-WONDER website and project these to the year 2050. The Contractor shall follow the approach described in the BenMAP-CE user manual and using the most currently available Census Bureau actuarial tables. As above, the Contractor shall provide BenMAP-CE-ready input files in .csv and .xlsx format.

After incorporating the data above, the Contractor shall perform a simple sensitivity analysis illustrating the influence of the updated death rates and population counts for a national-level analysis in the years 2020, 2030 and 2050. The Contractor shall document the results of this analysis in a memorandum to the WAM. Finally, the Contractor shall update the BenMAP-CE user manual to reflect the use of these updated datasets, editing the WAM-supplied MS Word version of the manual.

Deliverables:

3.1 Updated Woods & Poole projected population
3.2 Updated projected death rates
3.3 Sensitivity analysis memorandum
3.4 Revised user manual

Task 4 Updated economic values

The Contractor shall deliver the WAM updated inflation datasets through the most recently available year. Such datasets include the All Goods Index, the Medical Cost Index and the Wage Index. The Contractor shall also update the county-level median income values. The Contractor shall deliver these updated data to the WAM in BenMAP-CE-ready input format as .csv and .xlsx files, and update the user manual as appropriate.

The Contractor shall also re-index all of the United States Cost of Illness and Willingness to Pay economic unit values from a base year of 2000 to a base year of 2010. The Contractor shall update the user manual as appropriate. The Contractor shall provide these data to the WAM in BenMAP-CE ready input format as a .csv and .xlsx file.

Deliverables:

4.1 Updated inflation datasets
4.2 Updated economic valuation functions
4.3 Revised user manual

VI. Reporting Requirements:

All reports shall be in accordance with contract specifications. The Contractor shall submit work products in electronic as well as hard copy form. In addition, the Contractor shall deliver to the WAM each draft and final report in electronic format that is readable by OAQPS's windows-based word-processing (Microsoft Word 2007), graphics (Microsoft PowerPoint 2007), spreadsheet (Excel 2007), and database (Access 2007) programs.

VII. QA Requirements:

The Contractor shall include a quality assurance section in the final report discussing the data used with respect to precision, accuracy, representativeness, comparability, completeness, sensitivity and appropriateness as it applies to this use and its source. The QA section shall discuss how the Contractor ensured that the environmental data were of acceptable quality and that they were being used for the purpose for which they were collected.

VIII. Deliverables:

The Contractor shall adhere to the following schedule:

Task	Deliverable	Delivery Schedule
1.1	Cost estimate	20 days after effective date of WA
1.2	System design document	Ongoing
2.1	Revised draft version of DotSpatial	2 months after the effective date of the WA
2.2	Revised final version of DotSpatial	3 months after the effective date of the WA
3.1	Updated Woods & Poole projected population	2 months after the effective date of the WA
3.2	Updated projected death rates	3 months after the effective date of the WA
3.3	Sensitivity analysis memorandum	4 months after the effective date of the WA
3.4	Revised user manual	4 months after the effective date of the WA

4.1	Updated inflation datasets	1 month after the effective date of the WA
4.2	Updated economic valuation functions	2 months after the effective date of the WA
4.3	Revised user manual	4 months after the effective date of the WA